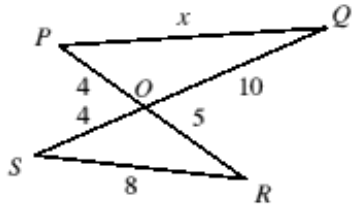
24. The diagram shows two straight lines PR and QS crossing at O.
What is the value of x?



A $7\sqrt{2}$ B $2\sqrt{29}$ C $14\sqrt{2}$ D $7(1+\sqrt{13})$ E $9\sqrt{2}$

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24. E As they are vertically opposite, $\angle POQ = \angle SOR$. Let α denote the size of each of these.
Applying the cosine rule to triangle SOR gives $8^2 = 4^2 + 5^2 - 2 \times 4 \times 5 \cos\alpha$, therefore $40 \cos\alpha = -23$.
Similarly, from triangle POQ we obtain $x^2 = 4^2 + 10^2 - 2 \times 4 \times 10 \cos\alpha$. So $x^2 = 16 + 100 - 2 \times (-23) = 162$.
Hence $x = \sqrt{162} = \sqrt{81 \times 2} = 9\sqrt{2}$.